AIRCRAFT HYDRAULIC SYSTEM

The airplane primary hydraulic system is a 3,000 psi closed center system. Power is supplied by two engine driven variable displacement pumps mounted on the two inboard engines. The pumps may be unloaded during flight when no hydraulic services are required by means of a manually controlled by-pass valve.

The hydraulic system is used to actuate the landing gear, wing flaps, wheel brakes, nose wheel steering, gust lock, cylinder, and the engine rotor brakes. Major units of the system, where possible, have been grouped in the left wheel pod to facilitate maintainance operations.

In addition to the engine driven pumps an auxiliary fixed displacement pump has been provided to operate the cargo loading doors and ramps, and any other hydraulic services which may be required while engines are not running. This pump is driven by a 10.5 horsepower, 400 cycle AC continuous duty motor and delivers approximately 6 gpm. An unloading valve and an accumulator are in the auxiliary system to permit continuous duty. It is also used as an in-flight emergency source of power.

The wheel brakes are provided with emergency air pressure sufficient for three full applications of brakes.

IFR HYDRAULIC SYSTEM

The hydraulic system which powers the in-flight refueling equipment is entirely independent of the aircraft's primary hydraulic system. The IFR hydraulic system is a power transmission system between large engine driven hydraulic pumps and the driving motors for the fuel boost pumps, main transfer pumps, and the hose reel drive. To this end its efficiency has been a major item of design, evidenced by the 4,500 psi operating pressure and high speed pumps and motors.

A hydraulic-mechanical automatic control regulates transfer pump output to maintain approximately 50 psi pressure at the drogue for varying transfer flow rates. Pressure pick-ups, representative of flow and discharge head, operate a 4-way transfer valve which in turn directs the servos controlling torque and speed for the transfer pump motors.

A high speed hydraulic motor of approximately 65 HP capacity drives the hose reel through a planetary gear reducer and roller chain drive. By means of a pressure control valve the motor torque may be regulated by the systems engineer as required under different operating conditions. Secondary variation of torque, as a function of length of hose extended, is superimposed on the primary tension control to assure stability with respect to reeling and unreeling of the hose. A multidisc brake, hydraulically applied, is provided for stopping or holding the reel at any position. A hydraulic cylinder controlled by a solenoid 4-way valve opens and closes the drogue door.

Electrical control is provided for all units including engine pump low pressure by-pass, solenoid control valves for motors and actuators, and emergency hose jettison. It is desirable, and appears feasible, to use cable controls for hose jettison and engine pump by-pass in the event of electrical failure.